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NOTES ON THE BLACK APPLE LEAF-HOPPER.

(*Idiocerus fitchi* Van D.)

W. H. BRITTAIN AND L. G. SAUNDERS,* TRURO, N.S.

Originally described by Fitch from New York State, this insect apparently occurs quite generally throughout the North-eastern United States and Canada. It is very common throughout the Annapolis Valley of Nova Scotia.

INJURIES.

Many farmers who have noticed this insect at work, have considered it to be a pest of some importance. Most of the injuries that they have attributed to its agency, however, have been brought about by other causes. Where numerous, the insects swarm over the new growth and particularly about the blossom clusters, where they may easily be observed feeding. Though unquestionably some damage results from their work, it is apparent, from a careful study of their feeding habits, that they are of little importance as fruit pests. Numbers of the nymphs were placed on apple seedlings, and their effect on the plants noted. There was no noticeable curling or blotching of the leaves as a result of even a relatively large number of nymphs on a small seedling. The only effect that could be seen, was that occasionally a bead of clear sap would be seen oozing through a punctured blossom pedicel or leaf petiole. This might eventually result in the withering and dropping off of the affected part. It was evident, therefore, that the damage done was not serious, and that the presence of the pest in the orchard, even in large numbers, did not justify the alarm sometimes caused by its appearance.

DESCRIPTION OF LIFE STAGES.

Egg.—Length .065 to 0.737 mm. Width 0.167 to 0.187 mm. Elongate, more or less cylindrical; widest near posterior extremity,

* Contributions from Entomological Division, Nova Scotia, Department of Agriculture.

which is rather broadly rounded; rather strongly curved near apex on one side; apex sharply curved on this side, broadly rounded on the opposite side; colour whitish; chorion smooth and shining.

Stage I.—Length 1.24 to 1.82 mm.; width of head including eyes .52 to .56 mm. General colour shining black. Eyes dark red. Head short and wide, broadly rounded before eyes. Thorax with fine yellowish median longitudinal line. First abdominal segment yellowish, with broad, dark brown band slightly procurved, not reaching lateral, posterior or anterior margins. Second segment sometimes yellowish, on posterior margin. Abdomen with numerous long, stout hairs regularly placed. Legs shining brownish black; coxae, trochanters and tarsi pale yellowish, excepting tip of claws which are brownish black. Antennae pale yellowish, basal segment darker, almost brown. Short, stout hairs on the entire length of tibiae, and a very few on the femora.

Stage II.—Length 1.48 to 1.75 mm.; width of head including eyes .55 to .6 mm. Head and legs relatively smaller than in preceding instar. Distal third of fore tibiae yellowish. Tips of tarsi and claws brownish black. Colouring in other respects similar to stage I. Tibiae very finely pubescent, with a few longer hairs at tip; not clothed for the entire length as in former instar. Entire surface of body and legs very finely granular, producing a less shining appearance.

Stage III.—Length 2.025 to 2.62 mm.; width of head including eyes 1.05 to 1.112 mm. Colouring similar to first two instars, excepting a continued modification of colouring on legs, the fore tibiae being brownish black on proximal half and yellowish on the remainder, while the distal extremity of the middle tibiae is yellowish. Wing-pads' apparent.

Stage IV.—Length 3.1 to 3.29 mm.; width of head including eyes 1.25 mm. Form and colouring similar to other stages; wing-pads prolonged, mesothoracic pair extending along sides of metathorax for two-thirds their length.

Stage V.—Length 3.65 to 3.82 mm.; width of head including eyes 1.47 to 1.55 mm. Body stouter than preceding stages, lateral margins being almost parallel, slightly the widest at eyes; prothorax a little narrower than head and longer; mesothorax shorter than prothorax and metathorax still shorter. Wing-pads

reaching just beyond articulation of 4th and 5th abdominal segments. Abdomen tapering gradually to 7th segment, thence more sharply to caudal extremity. Abdomen with usual arrangement of short, stout hairs, regularly placed. Last abdominal segment pale dusky yellow. Fore legs pale yellow, very slightly dusky on proximal end of tibiae and claws, others as in preceding instar.

Adult.—The following is the description given by Fitch (1) for this species:

Chestnut-brown varied with white; elytra hyaline, with a large, fuscous spot on the middle and another at the apex of the outer margin, with an intervening white spot; a faint, white spot towards the base of the sutural margin. Length 0.35 mm.

The more complete description of Osborne and Ball (6) is as follows:

Chestnut-brown with narrow, light stripes on pronotum, scutellum, and clavus. Length of female 5.75 mm.; male 5.25; width 1.7 mm.

Face, in the female, chestnut with broad circles around the large, black spots on vertex, and small crescents under the ocelli light yellow; in the male, yellow with a chestnut stripe down the middle and a darker one each side from the corner of the eye down the genae outside the lorae. Pronotum chestnut with a pair of black spots on the anterior margin, the posterior margin and three spots on the disc light yellow, scutellum with the margins and tip light yellow. Elytra brownish, the nervures darker, a narrow, light stripe on the outer margin of clavus, and a hyaline band crossing the apex and broadening towards the costa where it sharply interrupts the broad, dark margin.

Head scarcely wider than the short, convex pronotum, but very deep. The outer anteapical cell short, triangular, the nervure then curving away to the costa. Ultimate ventral segment of the female with the posterior margin rounding, slightly emarginate in the middle; male valve with the posterior margin acutely triangular, the sides concave.

FOOD PLANTS.

Fitch (1) records this species as having been taken on thorn bushes, and Osborne (7) reports it from the hawthorn and crab.

In Nova Scotia it is most common on pears and apples, swarming over the trees in large numbers during the spring and early summer.

LIFE-HISTORY.

The emergence of the nymphs from the eggs commences several days before the apple blossom petals open, and continues for some time after they fall, a period, speaking generally, including the latter part of May and the first part of June. The duration of the nymphal stage is from 7 to 8 weeks.

Some days after emergence copulation takes place, and shortly after this, the eggs are laid. Selecting a suitable place, most frequently in the fruit spur, or a roughened surface on one of the smaller twigs, the female makes a puncture with her beak. She then draws herself forward and inserts her ovipositor in the spot, remaining thus for several minutes. She then removes her ovipositor, rests for several minutes, and selecting another suitable location, repeats the process.

There is only one brood a year, the winter being spent in the egg stage.

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EXPLANATION OF PLATE IX.

Idiocerus fitchi.—Fig. 1, egg; figs. 2, 3, 4, 5, 6, first, second, third, fourth and fifth stage nymph; fig. 7, adult.

THE INSECT COLLECTIONS OF CANADA. I.

THE COLLECTIONS OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

BY C. J. S. BETHUNE, GUELPH.

When the Entomological Society of Ontario was organized in April, 1863, one of the objects set forth in its constitution was the formation of a general collection of insects. During the following year the records show that a cabinet of seven drawers was presented by Professor Croft, the President, and nearly 1,700 specimens were contributed by seven members. At another meeting held during the same year over 600 specimens, belonging to various orders were added to the collection. An excellent beginning was thus made through the generosity and enthusiasm of the members.

In December, 1869, the Society received a grant of \$400 for the year 1870, from the Board of Agriculture and Arts Association of Ontario, on condition that it "furnished an Annual Report, formed a cabinet of insects useful and prejudicial to agriculture and horticulture, and continued the publication of the *Canadian Entomologist*." In fulfilment of these conditions the first of the Society's Annual Reports was published and a cabinet of insects, arranged from an economic point of view, was prepared and placed in the rooms of the Association in Toronto. What became of this collection the writer has been unable to ascertain.

Being now possessed of an annual income, the Society made a grant of \$75 to the London Branch towards the purchase of a cabinet. With this aid the Branch procured a large, black walnut cabinet containing forty-five drawers and proceeded gradually to fill it with an excellent collection. It now forms part of the Society's property and occupies a place with the rest of our material in the Museum of the Ontario Agricultural College. A cabinet

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of fifteen drawers, filled with specimens, was bequeathed to the Society by its first Curator, the late Rev. James Hubbert.

In 1875 the attention of the Society was drawn to the desirability of sending a collection of Canadian insects to the Centennial Exhibition to be held at Philadelphia during the following year, and measures were taken to carry the project into effect. Aided by a grant of \$500 from the Commissioners appointed by the Dominion Government, the work was entered upon with great activity by the members resident in London. A specimen case of the kind used at the Museum of Comparative Zoology at Cambridge, Mass., was procured from Dr. Hagen, and a large number of similar style were constructed. A supply of sheet cork, of double the ordinary thickness, for lining the cases was obtained from England. All the members in London who had collections generously placed them at the disposal of the Committee who had charge of the work, and many others, resident in different parts of Ontario and Quebec, liberally assisted in supplying specimens to fill any requirements for the completion of the exhibit.

The work went on during many months, and in the spring of 1876 the collection was completed and sent to Philadelphia, where it arrived without injury to a single specimen. It consisted of eighty-six cases, forty-five of which were filled with Lepidoptera, twenty-seven with Coleoptera, three with Hymenoptera, five with Neuroptera (including the Odonata and some other orders), two with Hemiptera, three with Diptera and one with Orthoptera. When spread out in the Agricultural Hall they formed a double row more than seventy-five feet long and presented a very attractive appearance.

In order to ensure correctness in naming, all doubtful specimens were submitted to specialists as far as possible. Mr. A. R. Grote, the leading authority on the Lepidoptera, twice visited London, and on each occasion spent some days in carefully going over the collection. The Coleoptera were largely named by Dr. G. H. Horn, the Geometers were submitted to Dr. A. S. Packard, and the Neuroptera were identified by Dr. Hagen. The value of the collections for purposes of reference was thus immensely increased. Years afterwards the Noctuids were inspected by Dr. John B. Smith, and he could find but few instances of mis-identi-

fication. The chief credit for the successful accomplishment of this great task is due to the energy and enthusiasm of Dr. William Saunders and Mr. E. Baynes Reed, two of the original members of the Society.

In 1882 a portion of the collection, consisting of forty cases, was sent to the International Fisheries Exhibition in London, England, by request of the Dominion Minister of Marine and Fisheries. It was also sent to the Dominion Exhibition in Ottawa.

In 1886, in compliance with the request of the Dominion Government, and with the cordial approval of the Provincial Government, the whole of the Society's collection of Canadian insects was sent to England to form part of the Indian and Colonial Exhibition. The collection contained over ten thousand specimens, representing the various orders. Two of the cases were broken in transit, and a number of specimens of Lepidoptera were damaged. After the return of the collection to London, Ontario, it was decided that it should not again be sent away for exhibition purposes, in order that any danger of injury or loss might be avoided. From these exhibitions the Society received a number of medals, gold, silver and bronze, and several diplomas.

In 1890 the Society purchased the collections of Mr. Johnston Pettit, of Grimsby. These consisted of a cabinet of twenty small drawers, containing a fairly representative collection of North American Coleoptera determined for the most part by Dr. Horn and other specialists, and, therefore, valuable for reference; there was also a variety of specimens of exotic Lepidoptera and other orders.

The most interesting and probably the most valuable of the Society's possessions from a scientific point of view is the D'Urban collection of Lepidoptera. It consists of a single drawer (No. 16 in the large, walnut cabinet), containing 183 specimens of moths, mostly Noctuids and Geometers. In one corner is pinned the following note by Mr. E. Baynes Reed, dated London, November, 1871: "This collection of Canadian Moths was made by Mr. William D'Urban, formerly a resident of Montreal, but now of Exeter, Devon, England. They were taken to England by him and sent to Mr. Francis Walker at the British Museum for identification. Many of the specimens are the identical types of Mr.

Walker's catalogue. The labels are all in his handwriting. Mr. D'Urban sent the collection to Mr. E. B. Reed who reset them, taking care to preserve the identification. The collection has thus twice crossed the Atlantic."

The re-setting was probably a change from the English custom of pinning low to the use of long pins and to a much higher position.

Dr. J. McDunnough, of Decatur, Ill., has recently inspected the collection and has published a series of notes on a number of the specimens in vol. III, No. 1, of the Barnes & McDunnough, "Contributions to the Natural History of the Lepidoptera of North America."

Mr. D'Urban published "A systematic list of Lepidoptera collected in the vicinity of Montreal" in *The Canadian Naturalist and Geologist*, vol. V, pp. 241-266, and in vol. VI, pp. 36-42 under the title "Addenda to the Natural History of the River Rouge" (Montreal, 1860-1861) descriptions of new species of Nocturnal Lepidoptera, by Mr. Francis Walker of the British Museum, the types of most of which are in this "D'Urban Collection."

The remaining forty-four drawers of this cabinet contain a variety of very beautiful and interesting specimens from various parts of the world. Fifteen drawers are filled with gorgeous butterflies and moths from India, China, Japan, Africa, South America and the West Indies; six with beetles of wonderful shapes and colours from India, Australia, Africa and South America; two with East Indian Hymenoptera, Hemiptera and Orthoptera; one with tropical Arthropods (scorpions, centipedes, etc.) There are also four drawers of English Lepidoptera and one of Diptera sent by Mr. F. Walker of the British Museum. The remainder are filled with North American specimens from the Southern and Western States, Manitoba (collected by the late Mr. E. F. Heath), some remarkable hybrids of Saturnian moths, silk and cocoons, Insect Architecture, etc.

The most important collections belonging to the Society are contained in one hundred drawers arranged in five double cabinets. Twelve drawers are filled with Butterflies, six with Sphinges, twelve with Bombycid moths, nineteen with Noctuids, six with Geometers and seven with Micro-Lepidoptera. The remaining

thirty-eight are filled with Coleoptera. This is a purely Canadian collection, almost entirely from Ontario. The specimens have in nearly all cases been named by specialists when they were brought together for the Philadelphia Exhibition, and are therefore most valuable for reference and comparison; but unfortunately date and locality labels were not thought of so much importance in those days as they are now, and comparatively few are provided with them.

A walnut cabinet of fifteen drawers contains North American species of Hymenoptera (five drawers). Diptera (two), Neuropteroid insects (two), Odonata (three), Hemiptera (two) and one of Orthoptera. These are for the most part collections made many years ago, with very few recent additions. The Neuropteroid specimens were named by the late Dr. Hagen, of Harvard University. The Society has a very meagre collection of insects outside of the Lepidoptera and Coleoptera, contributions of specimens of any other orders would, therefore, be most acceptable.

In addition to the foregoing, the Society possesses a large number of book-boxes containing a great number of Coleoptera from California, and many specimens of British and exotic Lepidoptera. All the collections are carefully gone over at least twice a year to guard against any injury from Anthrenus or other museum pests.

A NEW SARCOPHAGA FROM NEW YORK.

BY R. R. PARKER, STATE COLLEGE, BOZEMAN, MONTANA.

Sarcophaga fulvipes dissidia, n. subsp.

1914. *Sarcophaga fulvipes nigra** Parker, Proc. Bos. Soc. Nat. Hist., vol. 35, No. 1, pp. 38, 40, 41. Characters.

1916. *Sarcophaga fulvipes* var., Aldrich, *Sarcophaga* and Allies, p. 184.

Holotype ♂.—Collection of C. W. Johnson, Boston, Mass. (♂) Posterior trochanter without "brush;" femur arched, its anterior face without ventral row of bristles (only a single distal bristle present); anterior and posterior faces of tibia each with a

* *S. fulvipes dissidia* was referred to in part one as *S. fulvipes nigra*, but *nigra* has since been found to be preoccupied; therefore, the subspecies is described under the name *dissidia*.

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very thick beard of very long, coarse hairs extending full length of tibia; middle femur clothed beneath nearly to distal extremity with long hair, posterior ventral row of bristles represented only by a few short bristles on about distal fifth; tibia clothed beneath on about its distal half with long, dense hair that anteriorly and posteriorly becomes coarser and beard-like, submesotibial bristle absent; vestiture of third ventral plate short and erect; genital segments dull orange, vestiture of both equally long, first large and without marginal bristles (possibly variable).

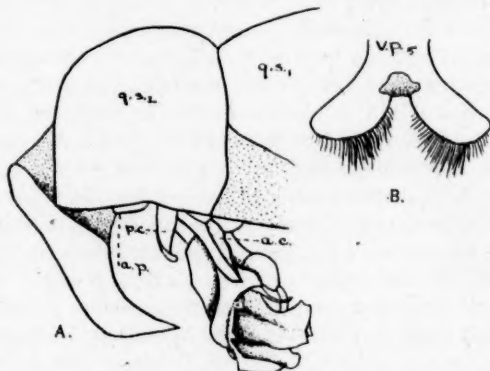


Fig. 7.—*Sarcophaga fulvipes dissidia*, n. subsp. A, Genital segments of ♂; B, fifth ventral plate of ♂.

Head.—Viewed from side, parafrontals and genae with dark reflections. Breadth of front at narrowest part about three-fifths eye width; cheek height approximately one-third that of eye. Front prominent, sides of frontal vitta slightly converging backward. Second antennal segment dark; third about twice length of second; arista plumose on basal two-thirds. Back of head somewhat convex, with three rows of black cilia behind eyes, otherwise clothed with yellowish white hair that completely covers the metacephalon. Cheeks clothed with black hair. Gena with a single row of bristle-like hairs near lower eye orbit. Palpi dark.

Chaetotaxy.—Lateral verticals absent; vibrissae inserted just above line of oral margin.

Thorax.—Mesonotum clothed with erect, almost bristle-like

hair. Hairs covering anterior spiracle dark brown basally becoming lighter toward tips; those of anterior margin of posterior spiracle dark brown; those of spiracular cover light yellowish brown with yellowish tips. Epaulets dark.

Wings.—Bend of a fourth vein a right angle; anterior cross-vein more basal than end of first longitudinal; costal spine vestigial; third vein bristly; section III of costa about one and one-fourth times section V; alulae fringed with hair; calypters whitish, margins fringed with white hair.

Legs.—Dark; all tarsi distinctly shorter than their respective tibiae. Posterior trochanter without "brush;" femur cylindrical, arched, clothed beneath with long hair that forms a beard posteriorly; anterior face with but two rows of bristles, an upper and an intermediate, latter not developed distally, of lower row a single distal bristle present; posterior face without ventral row of bristles; tibia curved, anterior and posterior faces each with a very thick beard of very long, coarse hairs extending full length of tibia, latter somewhat the stronger; fourth tarsal segment at least one-half fifth. Middle femur clothed beneath nearly to distal extremity, especially posteriorly, with long hair; anterior ventral row of short bristles complete, posterior row represented only by a few short bristles on about distal fifth; tibia clothed beneath on its distal half or slightly more with long, dense hair that becomes coarser and beard-like anteriorly and posteriorly; submesotibial bristle absent. Ventral surface of anterior coxa with an irregular row of bristles at each side and anteriorly with others between them; tibia with a beard-like line of short hairs distally on posterior face (probably absent in small specimens).

Chaetotaxy.—Anterior dorsocentrals slightly reclinate, not weaker than anterior postsuturals; anterior acrostichal absent; last two pairs posterior dorsocentrals strong, anterior to these several pairs that are mostly very weak and scarcely distinguishable from vestiture of scutum; prescutellar acrostichals present; scutellar apicals present; three sternopleurals, middle one weak; lower sternopleura with a single row of bristles, otherwise clothed with long hair.

Abdomen.—Somewhat conical; clothed above with short, reclinate bristles, beneath with somewhat longer, more erect hair.

Ventral plates as a whole, with their sides slightly converging posteriorly though they may appear approximately parallel; vestiture decreasing in length posteriorly, that of third very short and erect. Posterior margin of fourth notum of same colour as genital segments. Fifth ventral plate (v. p. 5) typical.

Chaetotaxy.—Second segment without marginal bristles, third with two; fourth with complete row ending ventrally in long hairs.

Genital Segments.—Prominent; dull orange; vestiture of both equally long. First (9 s.₁), large, in profile slightly arched, marginal bristles absent; second (9 s.₂), rotund; not flattened; anal area small, its upper limit not extending to middle of posterior surface. Forceps darkened, tip very strongly bent forward, in profile vestiture extends to forward bend, prongs approximated to bend.

Genitalia.—Head of penis large and its structure complicated. Tips of posterior claspers (a.c. and p.c.) bent forward, flattened dorso-ventrally. Accessory plates hairy (a.c.).

(♀) Not known.

Described from 1 male specimen.

Range.—Type specimen taken at Niagara Falls, N.Y.

Aside from the striking difference between this subspecies and *Sarcophaga fulvipes* (Macquart), the point of greatest interest is the extremely heavy beards of the hind tibiae, which are the most striking of any species known to the writer. The hairiness of the middle tibia is also unusually long and abundant. Considering the extreme weakness of the middle sternopleural bristle, probably specimens will be found with this lacking, in fact, of the two specimens of *S. fulvipes fulvipes* examined, one has two sterno-pleurals on each side, the second two one side, three on the other. Comparatively, the posterior or lower calypter is very large.

The single specimen described belongs to the collection of C. W. Johnson, of Boston, as does one of the two specimens of *S. fulvipes fulvipes* examined. The latter were taken at St. Augustine, Florida. The genitalia of both subspecies are identical in all respects. The advisability of giving this specimen subspecific ranking may perhaps be questioned, but it seemed to me wiser to err in so doing than that such an extreme variation should be lost sight of. It may be a case of melanism.

S. fulvipes fulvipes Macquart differs from the subspecies just described in the following characters; sides of frontal vitta parallel or slightly converging backward (should probably be same variation in *dissidia*); second antennal segment dull orange; palpi light (dull orange); hairs covering anterior spiracle mostly grayish, bases dark; those of anterior margin of posterior spiracle dark at base only; those of spiracular cover yellowish, perhaps faintly darkened basally; epaulets dull orange, brownish basally (*Ravinia*-like); coxæ, trochanters, femora and tibiæ of all legs dull orange, tarsi brown or brownish orange; anterior dorsocentrals not differentiated except that one or two show anteriorly; anterior postsutural dorsocentrals not differentiated; two or three sternopleurals, middle one weak if three are present; first genital segment with or without marginal bristles, if present very slender and hair-like, several each side of centre; forceps only darkened distally.

The most striking of the differences above noted is the dull orange colour of the second antennal segments, palpi, epaulets and first four segments of the legs. Though all the anterior dorsocentrals are differentiated in the subspecies *dissidia*, this may be a variable character; the absence of marginal bristles on the first genital segment may perhaps be variable. In the smaller of the two specimens of *fulvipes* the bearded character of the middle tibiæ is far less distinct, the anterior tibia lacks a beard-like line of short hairs distally, the posterior beard of the hind tibia is much stronger than the anterior, and the ventral surface of the anterior coxa has an irregular row of bristles at each side only.

AN INTERESTING CASE OF INSTINCT.

BY L. M. STÖHR, ST. ALEXANDER'S COLLEGE, IRONSIDE, QUE.

While collecting last fall branches of Sumach which, on account of their great medullar development, often shelter different kinds of aculeate Hymenoptera, I was fortunate enough to find one that furnishes a striking example of instinct. The stalk referred to had been used as a dwelling by several Hymenoptera, as might be seen from the old cells, whose location is still perfectly noticeable. Later on a woodpecker, having remarked the presence

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of the insects, helped itself to a meal at slight cost, pecking three holes; one at 18, the other at 22.5 and the last at 30 cm., below the top of the branch. Notwithstanding the precarious condition of the stalk, opened at not less than four points, an insect thought it still serviceable and turned it into a nest for its progeny—and it must be owned, it did it well.



Fig. 8.—a Holes made by woodpecker.
a' Id. covered with pieces of resin (b').
b Pieces of resin forming barricade.
1-6 Cells separated by resin partitions.

One cell had been built at the bottom of the canal. A piece of resin formed the floor, a transverse partition of the same substance the ceiling. Up to the present time my observations of Hymenoptera making their nests in pithy plants have not yet furnished me with any instances of an Apoid using resin for the construction of partition. A bee, however, it was, since some yellow powder, which remained in a cell, was proved by microscopic examination to be pollen dust. In Europe the *Heriades truncorum* L. is said to use resin for the same purpose.

After this first cell had been constructed, the insect seemed to feel some misgivings concerning the ultimate fate of its progeny, and left unoccupied that section of the tunnel which extended as far as the lowest orifice bored by the woodpecker. Here the wonderful instinct of the bee reveals itself. It placed a first resin stopper just below the level of this aperture, a second one in the hole itself and a third above. The stopper applied to the orifice closes it, but imperfectly, and does not fill the whole tunnel on the inside. But the two other pieces, above and below, are quite cylindrical and close the tube hermetically. All danger of intrusion from below being thus removed, the bee constructed five other cells above this barricade. Once more it did not make use of the whole length of the tube between the two lateral openings, but stopped its work 2.5 cm. below the second hole. A straight

resin stopper, the last one, was applied just underneath this hole, and all the rest of the canal, some 24 cm., was left unoccupied. In the accompanying sketch only the section of the branch containing the woodpecker's holes has been represented.

We see here a case in which a Hymenoptera showed remarkable discernment by filling up an accidental opening in the stalk it had chosen as a home for its young, and which, if left open, would have proved fatal for the further development of its progeny. Moreover, the insect stopped its work in time to avoid a repetition of the same labour. Indeed, it is not easy to explain how the offspring—of moderate size as indicated by the length of the cells—could have made their way through a barricade twelve millimeters thick, like the one near the lowest orifice.

Must we now infer that the insect in question proved itself to be endowed with reason and intelligence? The problem has already been solved. Ferton* quotes a case in which an *Odynerus pasictum* L. covered with clay a lateral fissure several centimeters long. He mentions also two instances in which an *Osmia ferruginea* Latr. stopped up in the same way holes in a shell of a *Helix*. The *Osmia cornuta* Latr. in several cases repaired cracks in the walls of its nest. Of six specimens of *Heriades truncorum* observed by him, three filled up fissures with resin.

The above mentioned author infers from these facts that such actions are mere manifestations of instinct, and says in conclusion: "With Hymenoptera, acts of intelligence are exceptional; often those which seem such are nothing else than its manifestations of a habit but seldom remarked."

NEW COLEOPTERA.—VI.

BY H. C. FALL, PASADENA, CAL.

The preceding articles of this series have appeared at intervals from Aug., 1905, to Feb., 1912—under the caption "New Coleoptera, Chiefly From the Southwest." For the present one and any that may follow, the abbreviated title will be used, even though the majority of new species described may still come from the Southwest.

* Ferton: Sur l'instinct des Hyménoptères. Ann. Soc. Ent. Fr., 1901, pp. 142—144.

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Lathrobium shermani, n. sp.

Form moderate; reddish brown, shining, pubescent. Antennae rather stout, scarcely reaching the bases of the prothorax, outer joints moniliform. Head as wide as long, a little wider behind, the angles broadly rounded, surface rather sparsely punctate. Eyes wanting, but in their place a small, nearly smooth, whitish spot of about the size of the second antennal joint; beneath sparsely punctate, the gular sutures rather widely separated, most approximate at about the middle of their length, where they are distant by about the width of the penultimate joint of the maxillary palpi. Neck one-half as wide as the prothorax, the latter oblong oval, narrower than the head, longer than wide, just perceptibly narrowed behind, the angles all rounded, the posterior ones a little more broadly so, surface, finely rather sparsely, confusedly punctate, with narrow, ill-defined, smoother median line. Elytra distinctly shorter than the prothorax, humeri small, sides divergent, the width at the apex equal to that of the prothorax, punctures without serial arrangement, coarser than those of the prothorax, mutually distant by their own diameters or a little more; wings undoubtedly vestigial or wanting. Abdomen gradually a little widened to the fifth segment, punctuation finer, not close. Legs concolorous; front thighs stout, broadly angulate subapically beneath; front tarsi broadly dilated, hind tarsi three-fifths as long as the tibiae, basal joint short, terminal joint longer than the two preceding. Length 6.3 mm.; width 1.15 mm. North Carolina, Grandfather's Mt., 4,000-5,000 ft., September. (F. Sherman collector.)

The unique type is a male, having the sixth ventral segment broadly, rather deeply, arcuately emarginate, the segment bearing about the middle of its length on either side of the median line a short, transverse comb of closely placed, porrect, black spinules, about eight in number.

This species is remarkable in being the first blind—or virtually blind—Lathrobiid to be discovered in our fauna. In the European fauna the members of the subgenus *Glyptomerus* are similarly deprived of normal eyes, but the characters of *Glyptomerus*, as given by Casey in his Revision of the American *Pæderini* do not well fit our species. *L. shermani* is perhaps nearest to *Abletobium pallescens*

Casey, in which the eyes, though not lacking, are very small. The species is with pleasure dedicated to its discoverer.

***Tribalister striatellus*, n. sp.**

Rotundate oval, castaneous, moderately shining; above minutely, sparsely, evenly punctulate; elytra 6-striate, the four outer ones subentire, the two inner abbreviated at base; sutural stria punctate, the others scarcely so except near the apex; margin of elytra acute and continuous with that of the prothorax; discal striae entirely without cariniform outer margins. Propygidium coarsely, densely punctate, smoother narrowly along the base; pygidium more finely, sparsely punctate, with intermixed still finer punctures, the latter alone present at apex. Sides of body beneath very coarsely, densely punctate. Otherwise in nearly all respects as in *T. marginellus*. Length 2 mm.; width 1.5 mm.

Rhode Island, Berkley; a single example taken by the writer many years ago under a stone in early spring. It was then identified as probably *T. marginellus*, by Mr. Frederick Blanchard, but a recent comparison with the type of the latter inclines me to the belief that it is specifically distinct. In *marginellus* the upper surface is virtually impunctate except for the coarse punctures along the elytral apex (which are also present in *striatellus*); the so-called elytral striae, after the second, which is very finely impressed, are really not striae at all, but costae, the striae being completely obsolete and traceable only by the slightly different surface lustre along the inner side of the costae; the sutural stria is impunctate, the pygidium is less finely punctate, and the sides of the body beneath are less coarsely and densely so. The region between the hind coxae, involving the apical portion of the metasternum and the basal part of the first ventral segment is broadly depressed—not at all so in *striatellus*. The frontal stria is interrupted medially in *marginellus*, finely impressed and entire in *striatellus*. *Marginellus* was described in 1859, the type being from Maryland, and very few examples have since been taken. *Striatellus* also appears to be excessively rare, and I am not aware that a duplicate exists in collections.

HETÆRIUS.

***Hetærius zelus*, n. sp.**

Oblong, feebly convex above, rufo-ferruginous with fulvous pubescence. Head shining, vertex concave, sparsely punctate,

front and clypeus subimpunctate. Prothorax two-fifths wider than long, disk between the broad impunctate grooves much longer than wide, feebly convex, uniformly rather finely, not closely punctate, each puncture bearing a short, coarse hair; lateral area divided by a deep, transverse sulcus at basal third, the posterior portion globosely convex, rufo-piceous, glabrous, polished, with fringe of hairs along its outer margin; anterior portion slightly narrower than the posterior, of the usual flattened or slightly concave form, sides nearly parallel behind the oblique, apical truncature, surface rather coarsely, closely punctate and pubescent, the hairs becoming denser, longer and recurved along the posterior margin. Elytra slightly wider than the prothorax, one-fifth wider than long, sides feebly arcuate and just visibly converging posteriorly; subhumeral stria two-thirds the length of the elytra, first dorsal nearly attaining the apex, second dorsal three-fourths, and third dorsal two-thirds the length of the elytra, all the striae externally finely cariniform, punctuation fairly close, nearly uniform throughout, hairs short and plumose basally, becoming longer and simple apically where they are intermixed with still longer, sparse, recurved hairs which occur also along the lateral margins. Propygidium and pygidium sparsely uniformly punctured and setose, the pygidium becoming smooth at apex. Prosternum nearly flat at summit, striae sinuate between the coxae, arcuately convergent but not meeting at apical third, interstitial surface nearly smooth posteriorly, becoming closely punctate in front, densely so at apex; sides of prothorax beneath impunctate, numerous punctate in front of the coxae, meso- and metasternum smooth. Legs moderately long, the femora and tibiae sparsely, finely punctate, the latter flattened and expanded as in the allied species. Length (type) 2.25 mm.; width 1.5 mm.; the size practically constant in all examples seen.

Taken at Pasadena, California, October to March, under stones with *Formica pilicornis*. This species is similar to *tristriatus* in a general way, but with elytral striae nearly as in *morsus*, judging from the description of the latter. It is virtually of the same size as *tristriatus*, possibly slightly smaller, and evidently narrower. The cariniform margins of the first and third dorsal striae, which in *tristriatus* are densely squamose throughout their lengths are here not appreciably more densely clothed except near the base of the third stria.

Hetærius strenuus, n. sp.

This name is proposed for a form similar in all general features to *tristriatus* but larger and more densely punctate throughout. In *tristriatus* the head, prosternum posteriorly, legs and pygidium are sparsely, finely punctate. In *strenuus* these parts are all rather densely, more strongly punctate. Length 3 mm.; width $\frac{2}{3}$ mm. In *tristriatus* the length is 2.5 mm.

The type bears label—Santa Cruz Mts., California, April 17, 1900. It occurs with a black *Formica* with dark, rufo-piceous legs. A second precisely similar specimen has been taken at Pasadena by Mr. J. O. Martin—March 31, 1916—in whose collection it now is. It, together with one or more examples of *H. californicus* were found under the same stone in nest of what I believe to be *Formica pilicornis*.

H. loripes Csy. The description recently published agrees so perfectly in all respects except the punctuation of the head with *tristriatus*, that it is difficult to believe it can be really distinct from the latter, more especially since it comes from the region inhabited by *tristriatus*.

H. exiguus Mann. I have a specimen of this species collected by Dr. Fenyes, at Porvenir, New Mexico. As Mann's specimens were all taken at Pullman, Washington, I had supposed my New Mexico specimen to be something new until I made careful comparison with a paratype of *exiguus* kindly given me by Mr. Mann.

H. minimus Fall. This little species—described from Colorado—also occurs in New Mexico. It has been taken at "Lower Pecos" by Dr. Fenyes.

SAPRINUS.

Saprinus carinifer, n. sp.

Broadly oval, black, legs dark rufous, upper surface minutely alutaceous and dull throughout. Head finely rugulose. Prothorax twice as wide as long, sides strongly convergent and nearly straight to apical third; surface very sparsely, minutely, nearly evenly punctate, the sides longitudinally rugulose in about the lateral fourth, side margins fimbriate with very short hairs. Elytra across the humeri one-fifth wider than the sutural length, punctuation baso-medially similar to that of the prothorax, the punctures becoming only slightly larger and closer toward the sides, but

evidently though gradually so toward the apex, where they are separated by about their own diameters; dorsal striae obsolete, represented by fine carinae, the sutural attaining the apex but becoming obsolete near the base; fourth dorsal reaching the apical third, joining the obsolete sutural at base; third to first dorsals increasing in length, the last named entire; oblique humeral obsolete, internal subhumeral extending from base to apex, cariniform throughout; external subhumeral short, impressed. Propygidium and pygidium more coarsely and closely, nearly uniformly punctured. Body beneath coarsely, closely punctate at sides, minutely and sparsely so at middle. Prosternum very feebly convex at middle, the striae horizontal, diverging a little before and behind the coxae, broadly arcuately uniting behind the prosternal apex; interstrial area with a few minute punctures. Anterior tibiae quadridentate. Length 3.5 mm.; width 2.8 mm.

California. Described from a single example taken by Mr. G. H. Field in the mountains on the western border of the Colorado Desert. This is one of the finest and most distinct species in our fauna. The posterior tibiae are scarcely as wide as the middle ones, but are hardly narrowed apically. This fact, together with the nearly flat prosternum, indicates a position between Horn's first and second groups; it may, however, with about equal propriety be included in Horn's group IV. The rugulosity at the sides of the thorax is not due to the increase in size or longitudinal confluence of the punctures; the latter are scattered over and between the rugulosities and remain about as minute and sparse as at the middle of the disk.

***Saprinus ciliatoides*, n. sp.**

Closely related to, and very like *ciliatus*, but on comparison with type of the latter seems distinct by its larger size and generally sparser, more minute punctuation. In the type the elytra are as Horn describes them, "densely aciculate punctate at sides and apex," the punctures well separated only in the baso-sutural region and narrowly along the suture posteriorly. The punctures are in general elongate, a tendency that is evident even where they are sparsest. In the present species the punctures are everywhere nearly round, very sparse and fine on the disk, and even where closest, as at the sides and apex, they are rarely much closer together than

their own diameters. The form, colour, striae, prosternum, etc., are virtually as in *ciliatus*. Length 3.2 mm.; width 2.5 mm. (Length of *ciliatus* 2.5 mm.)

Nevada, Las Vegas. One specimen. I have seen another, apparently the same, placed with the type of *ciliatus* in the Le Conte collection; it was taken by Crotch near San Bernardino, California.

***Saprinus martini*, n. sp.**

Moderately robust, brownish piceous with faint æneous lustre, integuments polished. Head densely punctate. Prothorax ciliate at sides, densely punctate in front and at sides, becoming rapidly but not abruptly smooth in the baso-medial region; the posterior margin punctate. Elytra moderately, strongly and closely punctate throughout, except between the sutural and fourth dorsal striae, the smooth area rather well defined but not sharply limited behind, the punctures extending further forward within the fourth stria than along the suture. First and second dorsal striae attaining the apical third, third and fourth dorsals sub-equal and shorter, sutural entire and joining the fourth dorsal; internal subhumeral oblique, continuous with the humeral, parallel with and as long as the first dorsal; external subhumeral short, distinct from the marginal. Propygidium and pygidium densely but not confluent punctate, the punctures becoming finer at the apex of the latter. Prosternum rather strongly convex but not compressed, the striae divergent and terminating in foveae, which are more remote than usual from the prosternal apex. Margin of front tibiae about 6-denticulate, each denticle bearing a stout spinule. Length 2.4-3 mm.; width 1.8-2.2 mm.

California. Described from two examples taken by Mr. J. O. Martin in Palm Canyon, on the western border of the Colorado Desert. This species is of the same form and general appearance as the common *fimbriatus*; this latter, however, having the prosternum compressed, belongs to a different group. *Martini*, by its prosternal character, belongs to Horn's group VI, and by the ciliated margins of the prothorax is nearest *ciliatus*. In the latter the punctuation of the elytra is more aciculate, the second dorsal stria shorter than the third, and the prosternal foveae are less distant from the apex.

***Bactridium californicum*, n. sp.**

Similar in general appearance to *striolatum*, to which it is

most nearly allied by the characters used in Horn's table.* Form a little less robust than in *striolatum*; colour reddish brown, the elytra more rufous, with a small, diffuse, darker scutellar spot and the apical third, piceous; antennæ and legs rufotestaceous; surface distinctly reticulato-alutaceous, feebly shining. Head and prothorax coarsely not closely punctate. Head a little narrower than the prothorax, the latter quadrate with obtuse angles; sides straight, just perceptibly convergent posteriorly, margin feebly crenulato-denticulate, disk flattened medially. Elytra a little wider than the prothorax, finely striate, the striae distinctly, rather closely punctate. Pygidium and last ventral segment very coarsely, closely punctate; segments 2-4 each with a single transverse series of coarse, elongate, closely placed punctures; coxal lines of first ventral distinct, nearly or quite attaining the posterior margin of the segment. In the male the last ventral segment is shorter than the three preceding united, the tip truncate. In the female the last segment is fully as long as the preceding, oval at tip. Length 2-2.3 mm.; width .55-.65 mm.

Southern California, Ojai Valley, March, under bark of dead sycamore. A good series of this species taken by the writer has stood in his collection for more than twenty years without a name. As compared with *striolatum* it is a little less robust with differently coloured elytra, more distinctly alutaceous integuments, less irregularly punctured prothorax, and elytral striae almost completely attaining the apex. In the single example of *striolatum* before me the elytral striae are more abbreviated, with numerous irregularly placed punctures at apex. As compared with *striatum*, the only other species of this genus that enters California, the present species is a little larger and stouter, with better defined elytral striae and much more coarsely punctured under surface.

Sphindocis, new genus.

Closely allied to *Orthocis* in its elongate parallel, slightly depressed form, subglabrous surface, posteriorly margined elytral suture, and simple apex of the anterior tibiae. The maxillary palpi are stout, the last joint widely truncate, instead of pointed as in *Orthocis*, antennæ 11-jointed, the basal joint stout, oval, 2nd similar but smaller; 3rd as long as the 2nd but more slender, about twice as long as wide; 4th to 8th gradually shorter, the 8th

*Trans. Am. Ent. Soc. XII, 1879, p. 265.

slightly transverse; 9th to 11th forming a loose club. Head and clypeus simple in the male, in which sex there is a small setigerous fovea near the base of the first ventral segment.

***Sphindocis denticollis*, n. sp.**

Rufotestaceous, strongly shining, prothorax and elytra coarsely, closely, uniformly punctate; head similarly but not quite so coarsely so. Prothorax one-third wider than long, sides parallel and broadly arcuate, margins narrowly, abruptly reflexed and quadridentate. Elytra scarcely wider than the prothorax, slightly more than twice as long as wide, sides parallel to apical two-fifths, apex evenly rounded. Beneath coarsely, closely punctate anteriorly, abdomen except the basal segment finely and sparsely so. Length 3.75 mm.; width 1.25 mm.

California (Alameda Co.). A single male. If we exclude the Rhipidandrinae this is the largest Cicide known to me. In its size and denticulate thorax it somewhat suggests *Odontosphindus*. The surface, as in *Orthocis*, is not perfectly glabrous, each puncture bearing a very minute hair.

**SEASONAL IRREGULARITIES IN THE
OCCURRENCE OF DRAGONFLIES.**

BY E. M. WALKER, TORONTO.

The exact composition of the dragonfly fauna of a given locality is subject to frequent change. The effects of erosion on the beds of streams, the deposition of sediment and the accumulation of organic debris in lakes and ponds are constantly producing gradual changes of environment which react on the Odonate fauna, as on other groups of aquatic life, resulting in time in the disappearance of many of the original resident species and the invasion of new forms better adapted to the altered conditions. The drying up of water-courses, due to the clearing of the forests, the pollution of streams and the filling of ponds and swamps are also causing the disappearance of many species from the affected localities, while other species previously unknown in the district find suitable breeding-places in newly created bodies of water, such as result from damming streams, the construction of canals, drainage ditches through swamps and along railways, gravel pits and other excavations, etc.

May, 1917

But apart from the changes due to alterations in their breeding-places, additions to the local list of dragonflies in well-worked localities are of frequent occurrence and are doubtless generally due to the great powers of rapid and sustained flight possessed by these insects, and the tendency of many species to wander far afield from their place of emergence. This wandering tendency in some species amounts to a true migratory instinct, and it has been recently shown in a very interesting article by Howard J. Shannon* that certain species such as *Anax junius*, *Libellula pulchella* and *Tramea lacerata*, together with other insects, notably the Monarch Butterfly (*Anosia plexippus*), follow regular annual migration routes which are closely similar to those of birds. I have never witnessed such a migratory flight, although they have been frequently reported, but it may be of some interest to record some desultory observations I have made, which seem to indicate that some of our Odonata habitually fly distances of many miles during their ordinary foraging excursions, and that the occurrence of large numbers of a particular species in a given locality does not necessarily indicate that they were bred from water in that vicinity. They also illustrate the point already referred to, viz., the frequent occurrence in a particular locality of stray individuals of species not normally resident there.

These observations were made, for the most part, at De Grassi Point, on the west shore of Cooke's Bay, Lake Simcoe, Ont., where I have been collecting and observing dragonflies during a majority of the past 15 years, and they relate chiefly to the species of *Aeshna*, to which genus I gave special attention for several years, while accumulating material for my monograph of the group. This genus is, moreover, one that is of particular interest in this connection, as the species are all large insects of powerful and wide ranging flight, and are better represented than any other genus of Odonata in the vicinity of De Grassi Point.

I have described elsewhere** the occurrence at De Grassi Point during certain years, of vast numbers of *Aeshna canadensis* E. Walk. and *A. constricta* Say, and have noted that the swarms

* Insect migration as related to those of birds. The Scientific Monthly, vol. 3, No. 3, p. 227, Sept., 1916.

** The N. Am. Dragonflies of the genus *Aeshna*, Univ. Toronto Studies, Biol. Ser., No. 11, 1912.

were observed during very warm, still weather. The past two seasons (1915 and 1916) presented a remarkable contrast in weather conditions, and an equally marked contrast in the numbers of dragonflies in flight at the "Point." The season of 1915 was almost continuously cold and wet and dragonflies were so scarce that it was hardly worth while collecting them. The summer of 1916, on the other hand, was unusually hot and dry, particularly during the months of July and August, when *Æshna* is chiefly on the wing. This season was remarkable for the abundance of several species of dragonflies, notably *Æshna canadensis*, *A. constricta*, *Leucorrhinia intacta*, *Libellula pulchella* and *Sympetrum obtrusum*.

Almost immediately after my arrival at the Point, on July 12, 1916, I noticed that *A. canadensis* was very plentiful among the scattered trees along the edge of a dense wood and in a somewhat open grove of pine and oak. The hot, dry weather, which was to last nearly all summer had already commenced. On the 19th the dragonflies were so numerous in some places that one could scarcely take a step without flushing one or more from the trunks and branches of the trees. I often saw two or three on a single trunk, and once noted five on one dead branch.

Being curious to know whether the exuviae of this species would be correspondingly abundant, I visited the nearest marsh at the outlet of Wilson's Creek, a sluggish stream about three-quarters of a mile to the northwest, and another at the outlet of Whitefish Creek about a mile and a half to the south. A prolonged search at both places yielded only five exuviae and one full-grown nymph. Not a single adult was seen at either creek. I had always supposed that these two creeks were the principal breeding places of these species, as there are no others within several miles, but my doubts were now aroused. The absence of adults was expected as they always leave their breeding places soon after emergence, but the scarcity of nymphs and exuviae was significant.

On July 24 I left Lake Simcoe, returning on August 5. *A. canadensis* was now quite scarce in the woods, but *A. constricta* was beginning to appear and became daily more plentiful. By about the 15th its numbers had so increased that it was even more abundant than *A. canadensis* had been. Copulating pairs were frequently seen throughout August and in early September, steer-

ing their erratic course in the open or sometimes resting on low branches.

On August 18 I witnessed the largest flight of *Æshna* I have ever seen. They were first noticed about 5 p.m., flying a few feet from the ground over the grassy spaces and roadway just behind the cottages along the lake front. They were hawking after other flying insects such as midges (*Chironomidæ*), which were very abundant, and each dragonfly appeared to restrict its movements to a more or less definite area. In certain spots they were so abundant that there seemed to be about one for every square yard of ground surface. The day was hot but the sun somewhat obscured by the smoke of distant forest fires. The insects flew continuously, never being seen to rest. A number were captured, all proving to be *constricta*, males predominating. As the sun set they rose higher and began to disperse, and at 7.10 p.m., though still numerous, their numbers had greatly diminished and they were flying at about 30 or 40 feet from the ground. At 7.15 p.m. they had almost entirely disappeared.

On the same day earlier in the afternoon I visited Wilson's Creek to ascertain whether the swarms of *A. canadensis*, which had left the woods, had migrated there for breeding purposes, and also whether *A. constricta* or its exuviae were present. I found the former species in considerable numbers but nothing was seen of *constricta*. The numbers of *canadensis*, however, were quite insignificant as compared with those seen about the woods earlier in the season.

From now on *A. canadensis* gradually diminished in numbers, while *constricta* continued to be plentiful throughout August and in early September. A small number were seen at Wilson's Creek on Sept. 3, but they were flying high and apparently none were engaged in oviposition. Their numbers now began to dwindle at De Grassi Point, although there were still a few about the place when I left on Sept. 23. As they evidently did not go to Wilson's Creek to oviposit, or at most in small numbers, I went on Sept. 13 to the wide marshes at the mouth of the Holland River, about $3\frac{1}{2}$ miles from the Point. It was too cool for dragonflies to be flying in large numbers, but I saw a considerable number of *Æshnas* on the wing and found several others resting in the marsh grass.

All I could identify were *constricta*, and I felt satisfied that they would have appeared in much larger numbers had the weather been favorable. The Holland River is the principal source of Lake Simcoe and winds for many miles through wide prairie-like stretches of open marsh. I believe, therefore, that this river is the chief breeding-place for both species of *Æshna* and that the vast majority of individuals which spread over the countryside during their foraging excursions, ultimately return there to oviposit. I received reports of the occurrence of immense numbers of large dragonflies, presumably *Æshnas*, from the neighbourhood of Big Bay Point, almost ten miles north of De Grassi Point, and I am strongly of the opinion that these also came in large measure from the Holland River.

On the basis of this habit of wandering many miles from their breeding-places an explanation may be offered of the prevalence of these species of *Æshna* at De Grassi Pt. and other localities during warm seasons, and their scarcity during cool seasons. Warm weather induces activity in dragonflies and on hot, sunny days *Æshna* is frequently in almost ceaseless flight, while in cool, dull weather it scarcely flies at all. Hence, in warm seasons they spread to localities, more or less remote from their breeding-places, which under other conditions they do not reach at all. It is thus quite probable that the actual number of dragonflies which emerge from their breeding-places is not appreciably affected by the temperature of the surrounding air. It is also possible, however, that their numbers after emergence may be more rapidly decimated by their enemies in cool seasons than in warm, owing to their relative inactivity under these conditions.

The nomadic habits of *Æshna* may also be illustrated by the following instances of occasional or sudden appearances at De Grassi Point of species of this genus, other than *canadensis* and *constricta*.

On Sept. 9, 1916, I spent part of the afternoon at Wilson's Creek, watching the *Æshnas* patrolling the marshy banks of the stream near its mouth. I had supposed they were all *canadensis*, but on capturing one I was surprised to find that it was *A. eremita* Scudd, a common northern species, which I had never taken here before. My next capture was also *eremita*, both being old males

and one of them decidedly worn. The third specimen was *canadensis*, as were apparently the majority, though I took very few others.

On Sept. 19 I noticed *Æshnas* flying about the pastures where *A. constricta* had been so abundant, and at first sight I took them for this species, which was still abroad, though in declining numbers. My suspicions were aroused, however, on seeing them fly to rest upon the trunks and branches of trees, a habit not characteristic of *constricta*, so I captured one and it proved to be *A. verticalis* Say, a species which until then I had not seen that season. Several others of both sexes were taken with only one *constricta* among them, and during the few remaining days I spent at the Point, i. e., until Sept. 23, *verticalis* was the only species noticed about the pastures. All were old individuals, most of the females having broken abdominal appendages. This species is of rather regular occurrence at the Point but always appears late and in fully mature, if not worn, condition, and I have never found the nymph nor seen the adult in the vicinity of the marshes in this locality. I believe, therefore, that it does not breed here to any extent.

On Sept. 10, 1915, at about the same spot where *verticalis* was seen in 1916, I took a male of *A. tuberculifera* E. Walk., a rare species, never known before from this locality, although regional. On July, 1, 1905, a single male of *A. sitchensis* Hagen was captured by Mr. A. L. Walker, and on Sept. 2, 1906, I took a female of *A. subarctica* E. Walk. Both of these are northern species, the normal southern limits of whose range is far north of Lake Simcoe. They have not been seen here since.

Two other species of *Æshna* are known from De Grassi Point, *A. clepsydra* Say, of very rare occurrence, and *A. umbrosa* E. Walk., which is a regular resident of the upper shadier parts of the creeks, and is always common but never appears in swarms.

As regards the general Odonate fauna of De Grassi Point, several points of interest may be noticed here. The ecological conditions are not very varied, and the number of regular resident species is consequently rather small. In all, fifty-three species have been taken, all within an area of about a square mile; but of

this number no less than 13 species were captured on one occasion only. Ten of these are represented by single specimens the other three by two each. Of two others (*vide infra*) nymphs have been found but no adults.

The ten species represented by single specimens include, besides the species of *Æshna* already mentioned, *Epiæschna heros* Fab., ♂, with a broken wing, found floating on the lake; *Boyeria vinosa* Say, ♀, found ovipositing; *Didymops transversa* Say, ♀; *Erythemis simplicicollis* Selys, ♀; *Libellula luctuosa* Drury, ♂; *Sympetrum scoticum* Donovan, young ♂; and *Hagenius brevistylus* Selys., exuvia. A specimen apparently of the last-named species was also seen floating on the lake, from a sailboat. The three other species are:—*Tetragoneuria canis* MacLachlan, 2 ♂s taken within a few minutes of each other at Wilson's Creek; *Cænagrion resolutum* Hag., a pair in copula from the same locality, and *Æshna eremita* Scudd., 2 ♂s as already mentioned. Some of these species evidently breed here occasionally or permanently in small numbers, while others are doubtless strays from other localities.

The two species as yet found only in the larval state are *Chromagrion conditum* and *Cordulegaster* sp., both of which were noticed for the first time in 1916. The nymphs of the former were taken from the upper part of Whitefish Creek on Sept. 10. I have never seen the adults in this vicinity but it is quite possible that I have overlooked it, if restricted to this spot. As to *Cordulegaster*, I have been searching for this elusive creature ever since my interest in dragonflies began, but I have never yet seen a living adult of any of the Eastern species that I can remember, though fragments of a specimen of *C. obliquus* found in a box of remnants, all apparently from De Grassi Pt., testify to my having once taken a specimen of this genus here. Of its capture, however, I have no recollection, and I had long given up hope of ever finding another *Cordulegaster* of any species in this locality. Imagine then my surprise and delight when on Sept. 11, 1916, while pulling up the masses of water-cress from a small brook (the upper part of Wilson's Creek) I brought to light two full-grown nymphs of the coveted genus. I continued the search and succeeded in getting all I could carry home. Some of these are still alive, and I hope to obtain adults from them during the coming season.

That such a large, conspicuous insect as *Cordulegaster* could have escaped my observation all these years, if it has been here continuously, seems at first sight improbable, and yet in this case I am inclined to believe, from the numbers of nymphs present in the creek, that the species is a regular resident. The adults of *Cordulegaster* are short-lived and their season of flight is probably over soon after the usual time of my arrival at Lake Simcoe in late June or early July, and my visits to their haunts, which have not been frequent, have probably all been too late.

In conclusion we may summarize the following points, which are suggested by the foregoing observations.—

1. Certain species of dragonflies are much more abundant in certain localities during warm seasons than during cold seasons.
2. This abundance is probably not due to the emergence of large numbers of individuals from their breeding-places, but to the greater activity of flight in warm weather, whereby the insects are dispersed to localities not visited in cooler seasons.
3. The Odonate fauna of a restricted locality contains a large percentage of transient resident species and stragglers from other localities, such species varying greatly from year to year.

THE NORTH AMERICAN SPECIES OF *HABROCYTUS* (CHALCID-FLIES).

BY A. A. GIRAULT, GLENNDALÉ, MD.

Generic Characters of Habrocytus.

The scutellum bears a more or less distinct cross-carina (or indicated as such) before apex (except in *medicaginis* and *borrowi*). The spiracular sulcus is present, foveate (exceptions noted). The clypeus is finely striate. The genus differs from *Pteromalus* mainly in mandibular structure but the abdomen is less flat, longer (conical) and the neck of the propodeum not usually conspicuous, but short and variable between the species. The propodeal spiracles are long and elliptical (smaller in *canadensis*). The types of all the species have been seen. The following table is based on the females:

May, 1917

Antennæ inserted somewhat below the middle of the face.
Parapsidal furrows not complete. Mandibles 3- and 4-
dentate.

1. Fore-wings with a large, smoky area under the whole of the marginal vein. Propodeum with a large neck, tricarinate. Abdomen produced beneath, with a very short petiole. Pedicel shorter than funicle 1, the latter twice longer than wide. Coxæ and femora concolorous, the middle tibia infuscated, the caudal so at base. Scutellum without a cross-suture before apex (or an indicated one). Clypeus sinuate.....*borrowi*, n. sp.

2. Fore wings hyaline.

Ovipositor not extruded. Coxæ above metallic, the legs lemon yellow, the antennæ yellow-brown. Clypeus sinuate rather deeply at apex. Antennæ inserted but a little above the ventral ends of the eyes. Spiracles at the base of a broad hollow, bounded by the lateral carina and a carina laterad of the spiracle, no sulcus. Propodeum tricarinate. Pedicel and funicle 1
subequal.....*onerati* (Fitch).

Coxæ concolorous, the femora brown or washed with metallic or metallic. Scape yellow.

Clypeus distinctly concave or sinuate at distal margin.

Propodeum tricarinate and with a very short neck (irregular rugæ between the carinæ). Funicle 1 somewhat over twice longer than wide, twice the length of the pedicel, 6 a half longer than wide. Tibiæ white. Marginal vein nearly twice the length of the stigmal. Femora usually washed. Funicle and club

black.....*rhodobæini* Ashmead (= *languria* Ashmead).

The same but the femora usually deep metallic, the tibiæ golden yellow, the funicle joints somewhat shorter, the flagellum brown...*phycidis* Ashmead (= *piercei* Crawford).

The same as *phycidis* but the tibiæ brown, white at tip, no median carina on propodeum, the foveæ of spiracular sulcus minute.....*cerealella* (Ashmead)

The same, but the femora and tibiae reddish brown, the tips of the last two pairs of tibiae broadly white. Funicle joints as in *phycidis*. Propodeum with a distinct neck. Abdomen more like that of

Pteromalus.....*rhodobæini rosæ*, new var.

Clypeus sharply incised at meson so as to appear bidentate there. Femora metallic. Flagellum black. Propodeum without a neck, scaly, impunctate, tricarinate. Scutellum without a faint cross-carina. Stigmal vein subequal to the marginal.

Funicle 1 a little longer than pedicel, somewhat longer than wide, 6 a little wider than long. Small species.....*medicaginis* Gahan.

Clypeus truncate or subtruncate. Femora barely metallic. Tips of tibiae white, the femora and tibiae brown yellow; striae of clypeus faint; antennae yellow, funicle 1 barely longer than the pedicel, longer than wide, 6 wider than long; stigmal vein somewhat shorter than marginal. Otherwise as in *rhodobæini*, but small.....*aulacis*, n. sp.

The same, but a half larger, the tibiae and tarsi lemon-yellow, the flagellum black, the club yellowish, the spiracular sulcus absent, the median carina irregular. Clypeal striae distinct.....*arkansensis* n. sp.

Coxae and femora concolorous, scape concolorous.

Clypeus rather deeply concaved or sinuate. Propodeum tricarinate, the neck short. Pedicel and funicle 1 subequal. Caudal tibia reddish brown, pale yellow at tip. Spiracular sulcus short, complete, bifoveate. Spiracle curved.....*franciscanus* n. sp.

Ovipositor extruded for a fourth or more the length of the abdomen.

Clypeus sinuate at distal margin, striate.

Coxae and femora concolorous, the scape yellowish brown.

Ovipositor extruded for a fourth the length of the abdomen.

Propodeum with a distinct neck, tricarinate. Funicle 1 twice longer than wide, much longer than the pedicel. Usual otherwise.....*dux* n. sp.

Coxæ alone concolorous, the legs white. Scape concolorous except at base. Ovipositor three-fourths the length of the abdomen.

The same as *dux* but slender (as in *Belonura singularis* Ashm.), no spiracular sulci, the spiracle oval, small, the lateral carina absent, no neck. Head subquadrate. Funicle 1 thrice longer than wide.....*canadensis* n. sp.

Habrocytus rhodobæini rosæ Girault.

Two pairs, Brooklyn, N. Y., February 9, 1913, from rose (A. S. Berquist). The *Habrocytus rosæ* Ashmead, in *Annals Ent. Soc. of America*, VIII, 1915, p. 278.

Types.—Catalogue No. 20414, U. S. National Museum, one male, two females on two tags.

Habrocytus medicaginis Gahan.

Several females reared in connection with *Bruchophagus funebris* from red clover seeds, St. Paul, Minnesota (W. Williamson).

Habrocytus aulacis Girault.

Two females, Wooster, Ohio, reared in connection with an *Aulax* gall.

Types.—Catalogue No. 20418, U. S. National Museum, two females on tags, a head and a caudal leg on a slide.

Habrocytus quinquecarinatus Girault.

This species has no spiracular sulcus. It differs from the other species in being varicoloured.

Habrocytus franciscanus Girault.

Three females, San Francisco County, California, July.

Types.—Catalogue No. 20416, U. S. National Museum, the females on tags, a head, the caudal legs and a fore wing on a slide.

Habrocytus borrowi Girault.

One female in the U. S. National Museum from Colorado. Dedicated to George Borrow.

Type.—Catalogue No. 20417, U. S. National Museum, the specimen on a tag, the head, caudal legs and a fore wing on a slide.

Habrocytus arkansensis Girault.

Males, females reared in connection with *Isosoma*, Garfield, Arkansas (T. S. Wilson).

The males have the antennæ entirely yellow, the legs (except the coxæ), golden yellow.

Types.—Catalogue No. 20419, U. S. National Museum, three females on tags, a head and caudal legs on a slide.

Habrocytus dux Girault.

One female, Canobie Lake, New Hampshire.

Type.—Catalogue No. 20441, U. S. National Museum, the female on a tag, the head and a caudal leg on a slide.

Habrocytus canadensis Girault.

Toronto, Canada (Wm. Brodie).

Type.—Catalogue No. 21071, U. S. National Museum, a tag and a slide.

Habrocytus cerealella (Ashmead).

Parasite of *Sitotroga cerealella*, Philadelphia, Pennsylvania.

Types.—Catalogue No. 6115, U. S. National Museum, tags and a slide.

Catolaccus anthonomi Ashmead has 3- and 4-dentate mandibles but I am not sure how many ring-joints, apparently three (but female type has lost antennæ).

The species *obscuripes* has an obscure cross-carina on the scutellum near apex, despite what I have said in the Annals of the Entomological Society of America, IX, 1916, p. 292. It does not belong here (tridentate mandibles).

THREE NEW SPECIES OF JASSOIDEA FROM MISSOURI.

BY EDMUND H. GIBSON, U. S. BUREAU OF ENTOMOLOGY.

With the addition of the following new species the total number of Jassoidea reported as occurring in Missouri* is brought to 155.

Tinobregmus moodii n.sp. Near *pallidus* Osb. but slightly larger, with loræ exceeding the middle of the clypeus and elytra not extending to pygofer.

Vertex narrow, broadening anteriorly; front narrow, elongate; clypeus elongate, at its widest point equaling width of front, only slightly emarginate at apex; beak extending to hind coxæ; cheeks long, flaring; loræ narrow, elongate, exceeding the middle of the clypeus. Pronotum short, length less than half that of width, posterior border slightly sinuate. Elytra ovate, not extending to the pygofer; veins rather indistinct. Length of female $6\frac{1}{2}$ mm. to tip of ovipositor; male $4\frac{3}{4}$ mm. long.

Colour, pale tawny yellow, vertex and pronotum of female unmarked, tip of vertex of male irregularly marked with fuscous; front and clypeus marked with a broad, longitudinal vitta on each side which coalesce just before apex of clypeus. Pronotum bordered laterally with fuscous; elytra subhyaline to opaque with a heavy, black border at the apex. Dorsal side of abdomen irregularly marked; pectoral pieces black; venter fuscous with whitish border; ovipositor black.

Genitalia, last ventral segment of female distinctly sinuous, ovipositor extending beyond the pygofer; male plates long and narrow with acute apex.

Described from one female and one male which are deposited in the collection of the U. S. National Museum. Specimens were taken in a sweeping from weeds growing on a high ridge of the Ozark Mt. range, near Branson, Mo., August 22, 1916, by Mr. F. M. Moody in whose honor the species is named.

*Note—Species of Jassoidea occurring in Missouri have been recorded as follows:

Gibson, E. H. and Cogan E. S. A preliminary list of Jassoidea of Missouri with notes on species. Ohio Jr. Sci., Vol. 16, No. 2, December, 1915.

Horsfall, J. H. Additions to the list of Missouri Jassoidea. Ohio Jr. Sci., Vol. 16, No. 8, June, 1916.

Gibson, E. H. Additions to the list of Missouri Jassoidea. Canadian Entomologist, Vol. 49, No. 2, February, 1917.

May, 1917

Euscelis ozarcensis n. sp. Resembles *arctostaphyli* Ball but can be distinguished by greater length of last abdominal segment of female, the lateral angles of which are more produced, also by having a much more simple colour pattern on vertex.

Vertex obtusely angulate, apex produced, length two-thirds that of width and about two-thirds length of pronotum. Front broad and only slightly convex. Clypeus parallel-margined, hardly twice as long as broad. Elytra short and broad, apical cells small, central anteapical cell only slightly constricted on inner side. Length 3 mm.

Colour, decided brown, with anterior margin of vertex and costal margin of elytra bright yellow. A transverse dark brown or black band between anterior portion of eyes. Posterior margin of vertex bordered with cream. Pronotum and elytra of same intensity of colour. Scutellum light brown. Elytra nervures prominent, very light brown to cream. Face marked with dark cross-bars. Cheeks irregularly marked. Below dark; tibia pale, pygofers blotched.

Genitalia, last ventral segment of female twice longer than penultimate, lateral angles produced; two slight notches, one on either side of ovipositor. Male plates triangular and twice the length of valve.

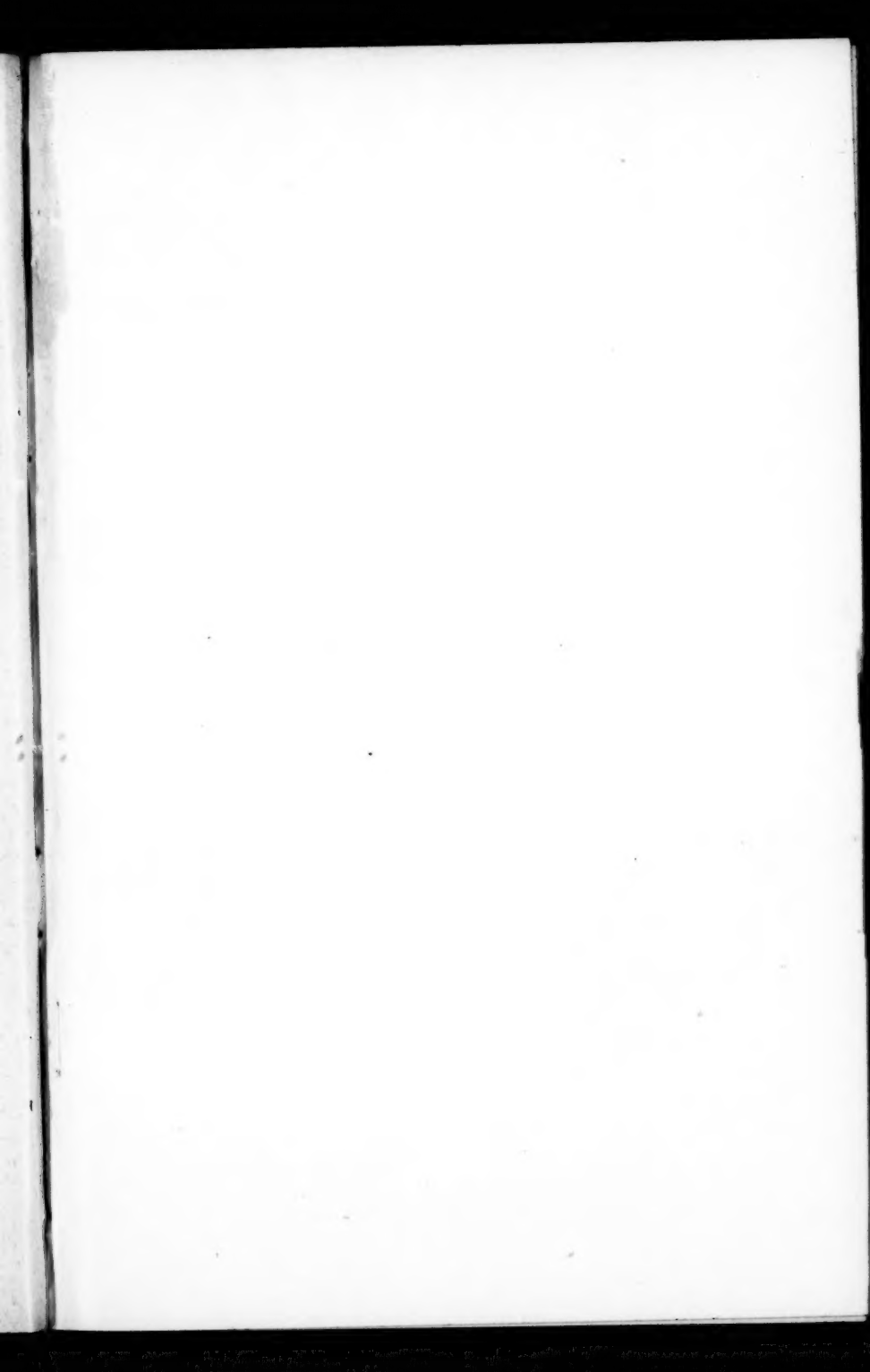
Described from two females and two males collected by the author in the Ozark Mts. near Branson, Mo., August 21, 1916, and now deposited in the collection of the U. S. National Museum.

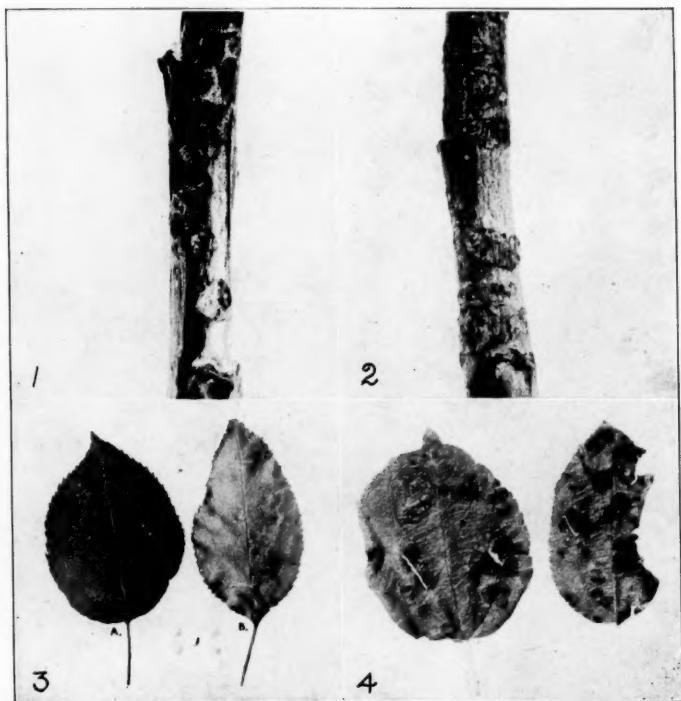
Typhlocyba modesta, n. sp. Near *rosæ* Linn., but differing in female posterior segment being distinctly notched, and in larger size. Face considerably longer than broad, clypeus less than one-fourth the entire length of face, superior angle of face obtuse. Length of pronotum hardly twice that of vertex. Scutellum large. Last ventral segment of female produced and rather deeply notched.

Colour, light yellow to cream, vertex slightly tinged with deeper yellow. Thorax, scutellum and abdomen concolorous. Elytra hyaline with apex tinged with yellow. Eyes brown; tip of ovipositor and tarsal claws dark brown to black. Length $3\frac{3}{4}$ mm.

Described from two females and one male collected by the author at Charleston, Mo., during May and June, 1916, and which are now deposited in the collection of the U. S. National Museum.

Mailed May 1st, 1917.





WORK OF APPLE LEAF MITES (P. 189).